

Overview of air quality management in the agriculture sector in Asia region and possible collaboration with ADB

ADB

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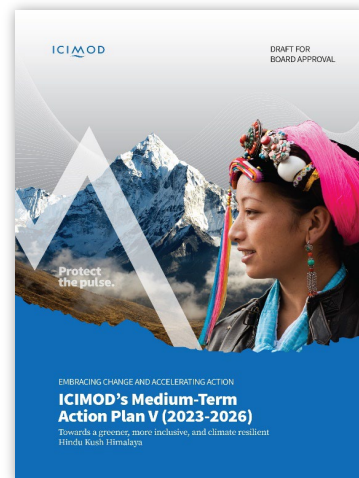


ICIMOD

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ICIMOD

- The International Centre for Integrated Mountain Development, a regional **intergovernmental organization** established in 1983
- **Knowledge and learning centre** working on behalf of the people of the Hindu Kush Himalaya (HKH)
- Improve the lives and livelihoods of men, women, and children of the HKH and protect **mountain environments** and cultures.



Our vision

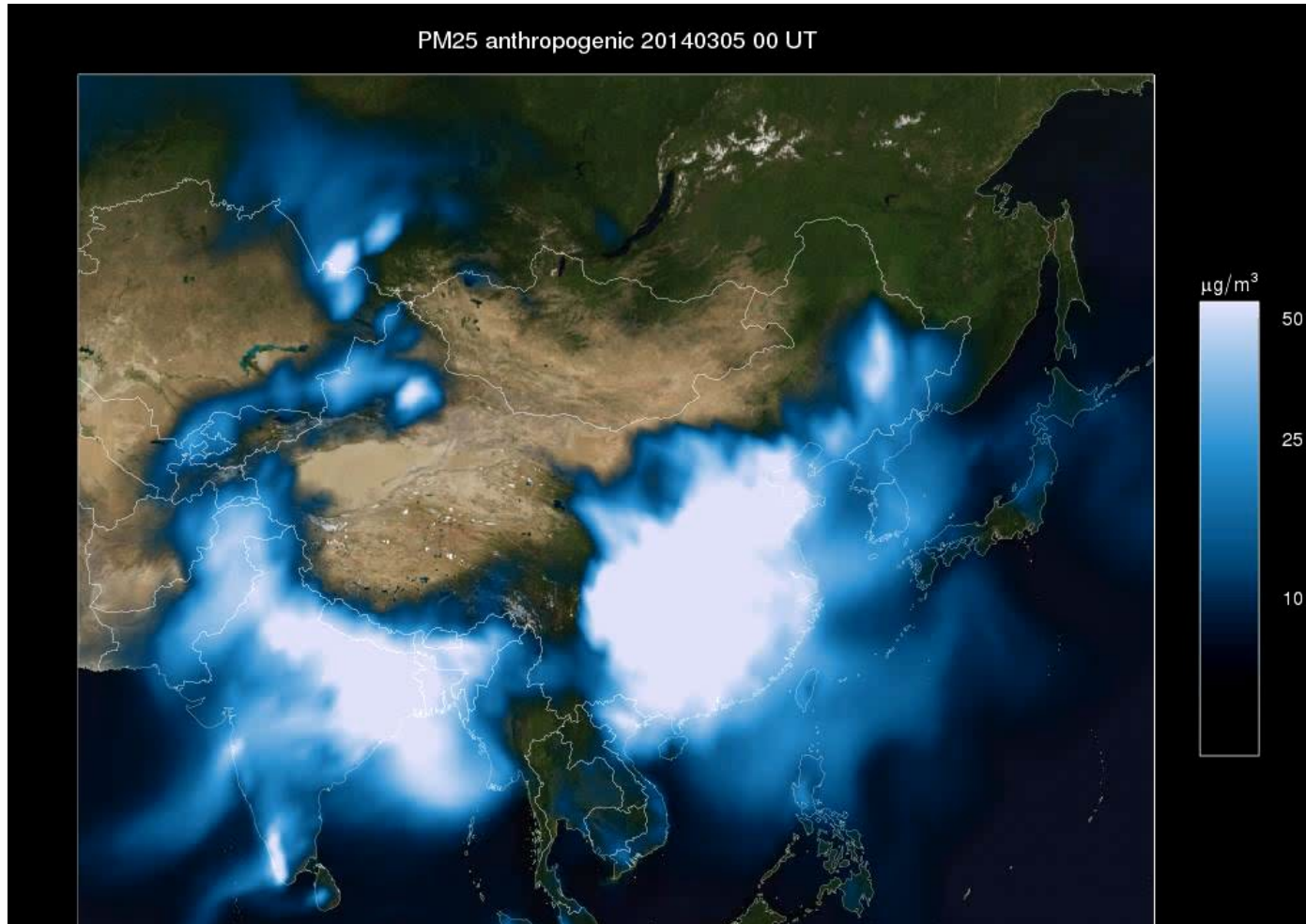
A **greener, more inclusive, and climate resilient** Hindu Kush Himalaya

- Resource efficient
- Carbon neutral
- Cleaner
- Nature positive
- Gender sensitive
- Youth empowering
- Equal opportunity
- Protected via disaster reduction measures
- Adapted via livelihoods/enterprises
- Transformed via systems (policy, financial, institutional)

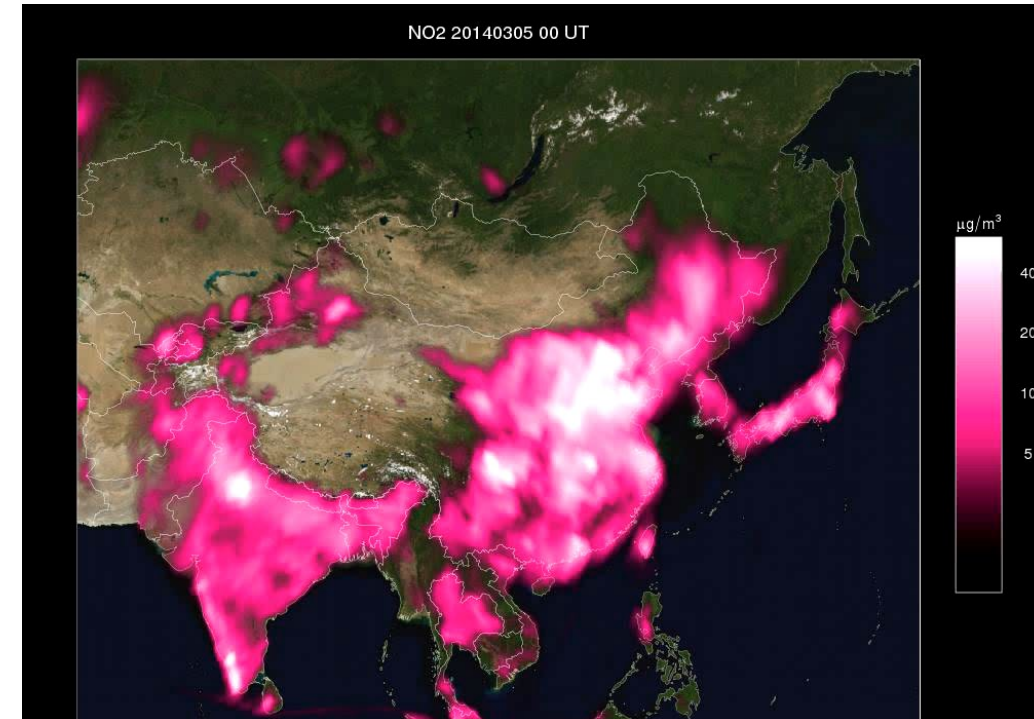


Air pollution revealed by modelling

PM2.5

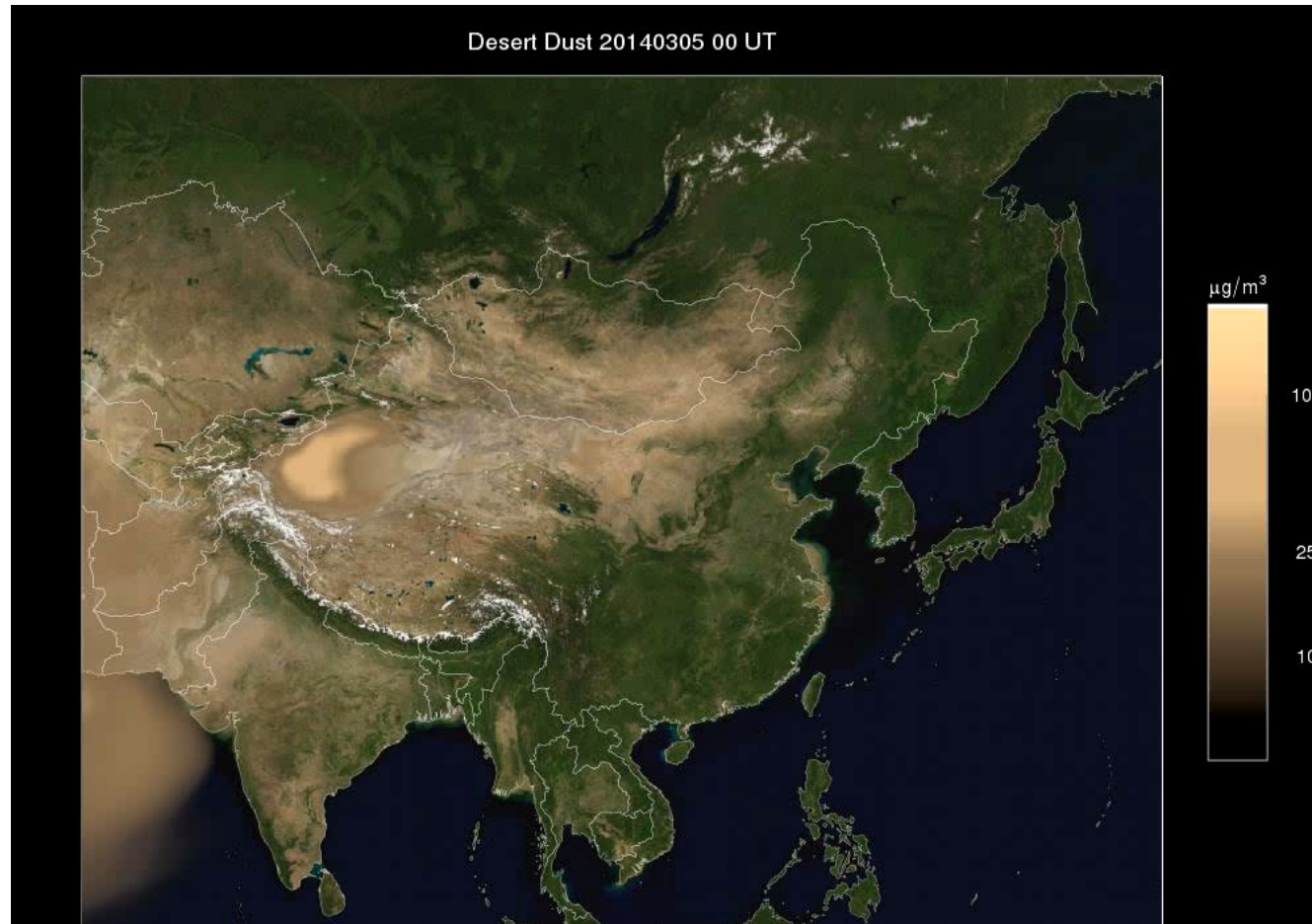


NO2



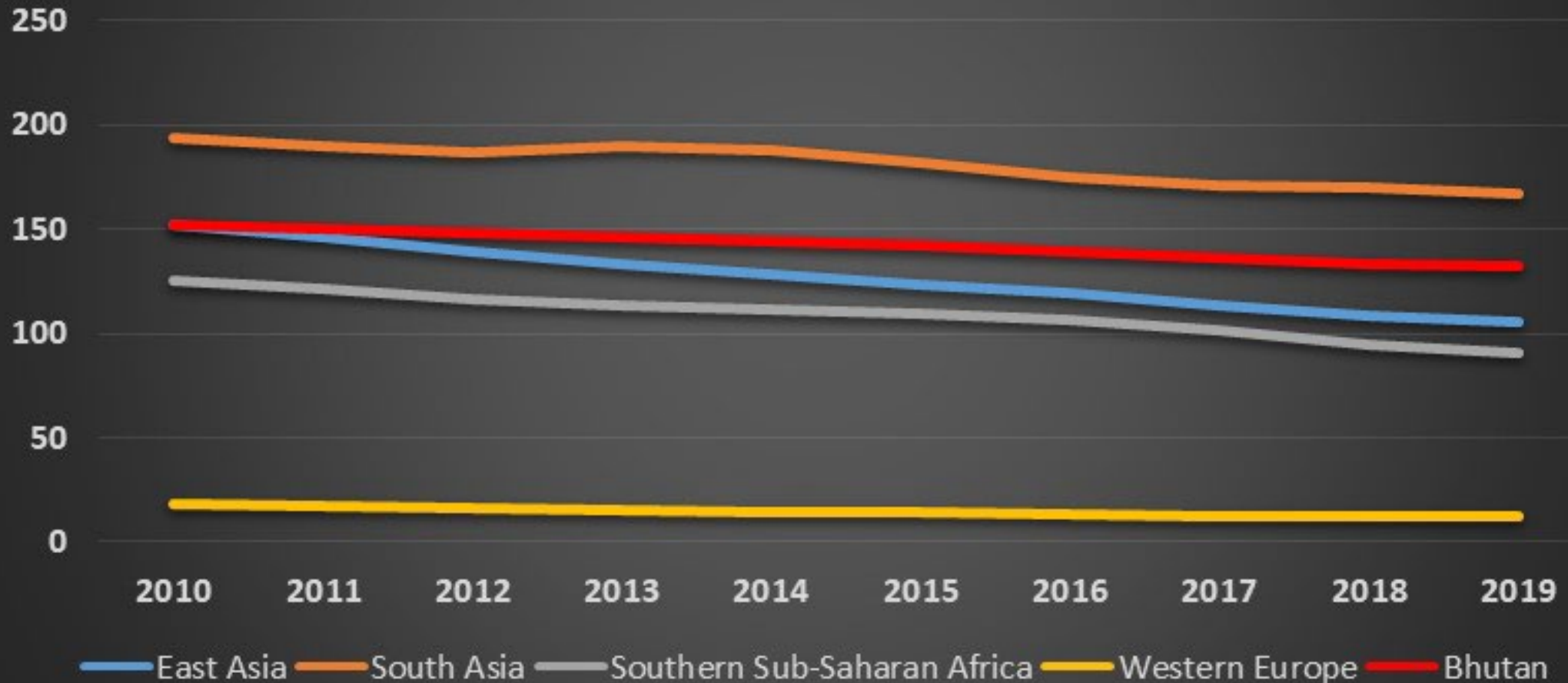
From Chemistry Transport Models

Natural dust



From Chemistry Transport Models

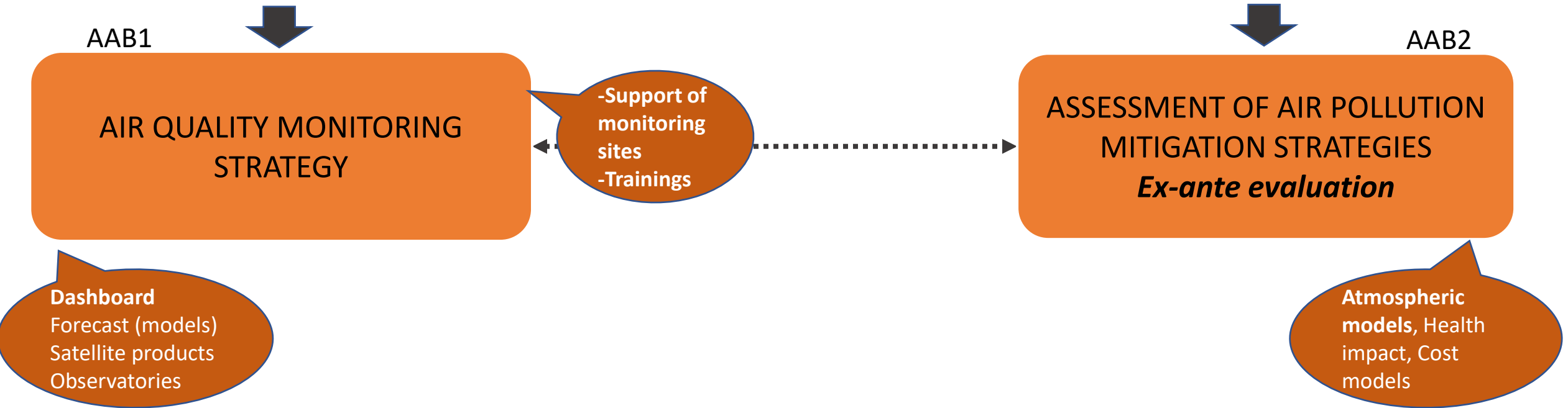
Age-standardized Deaths/100,000 Attributable to Air Pollution (Indoor & Outdoor)



Health Effects Institute. 2020. *State of Global Air 2020*
Source: *Global Burden of Disease Study 2019*. IHME, 2020.

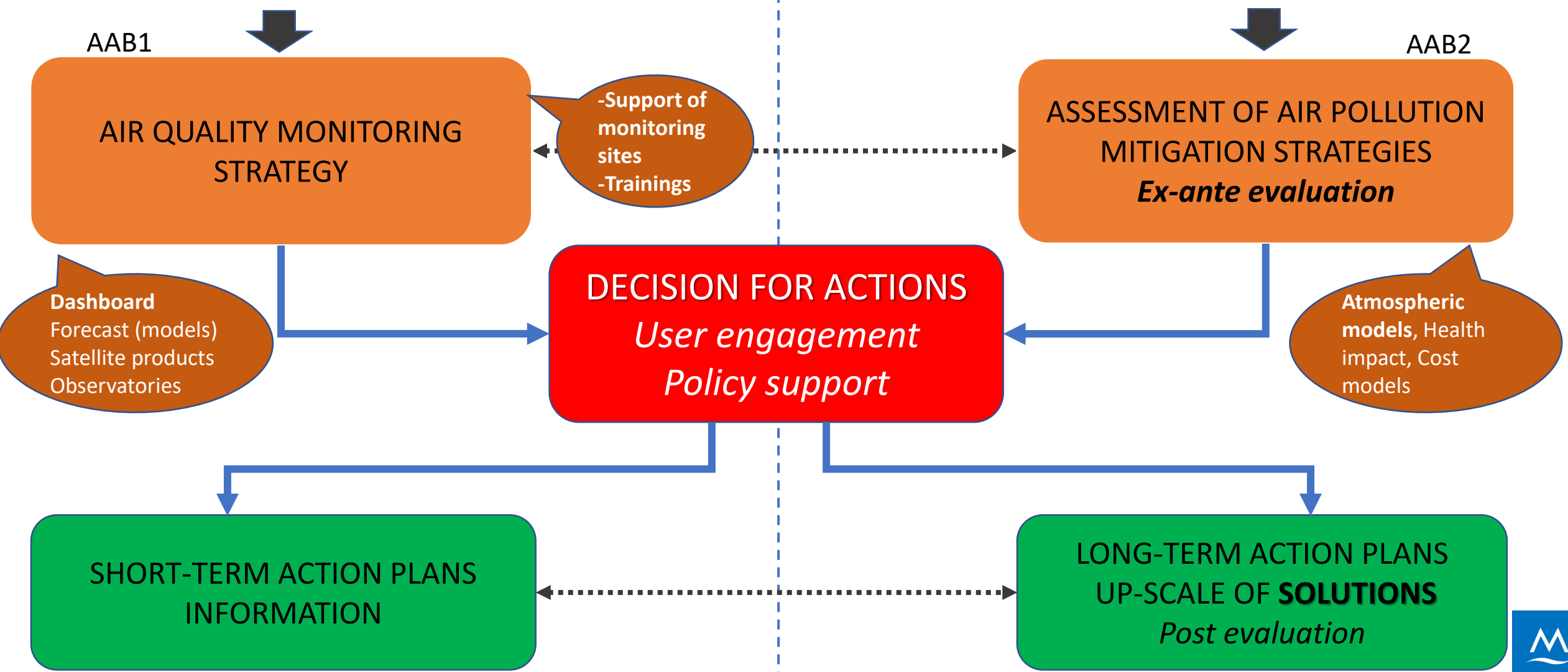
ACTIONS FOR CLEAN AIR SOLUTIONS

OBSERVATIONS - EMISSIONS – MODELLING *RAW DATA*



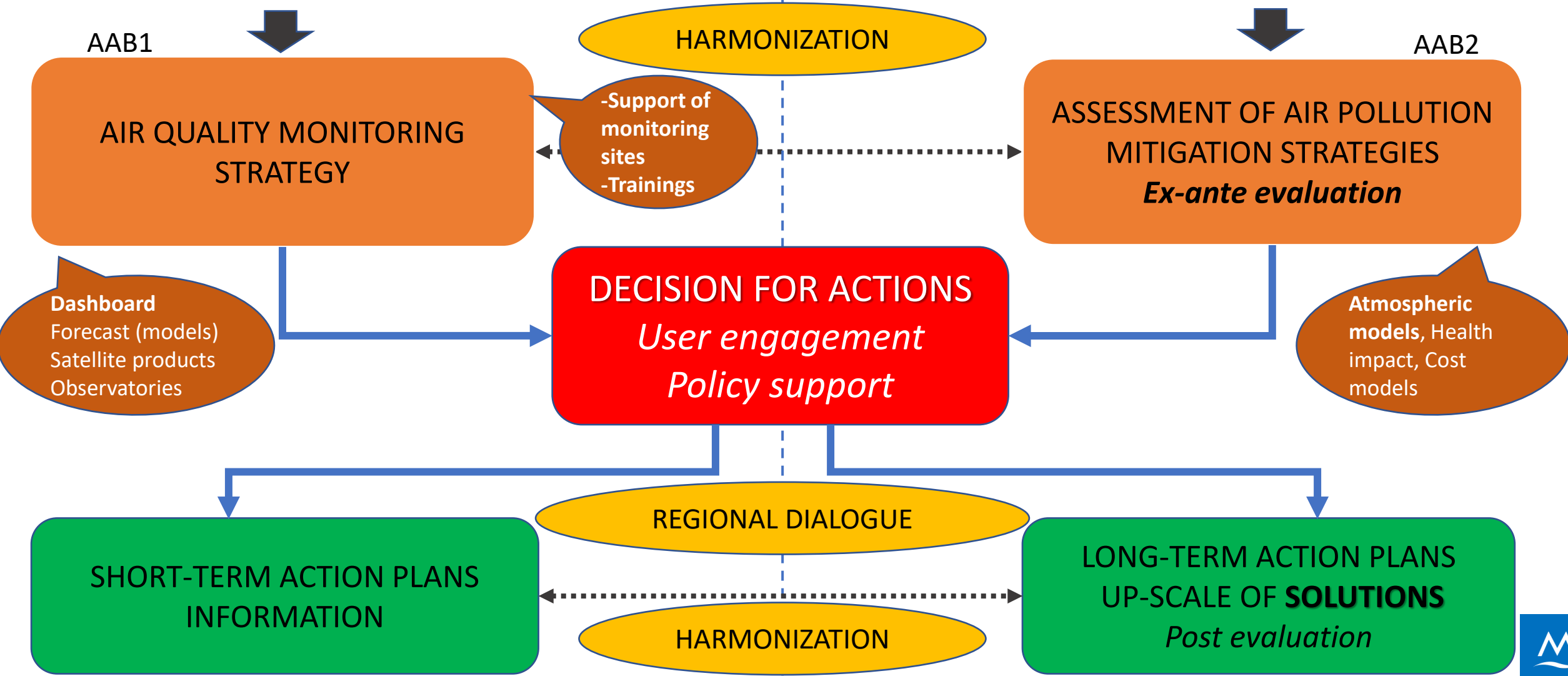
ACTIONS FOR CLEAN AIR SOLUTIONS

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ACTIONS FOR CLEAN AIR SOLUTIONS

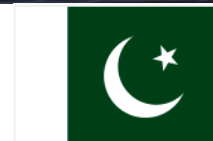
OBSERVATIONS - EMISSIONS – MODELLING RAW DATA



Kathmandu Roadmap (2022)

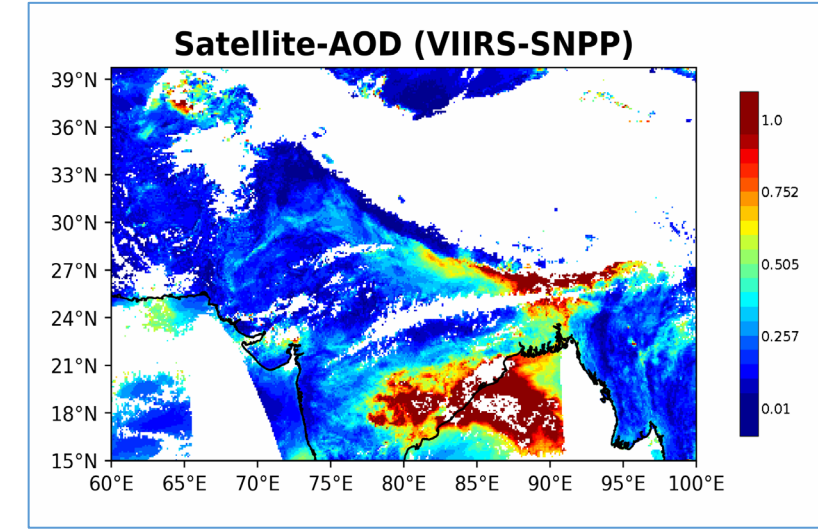
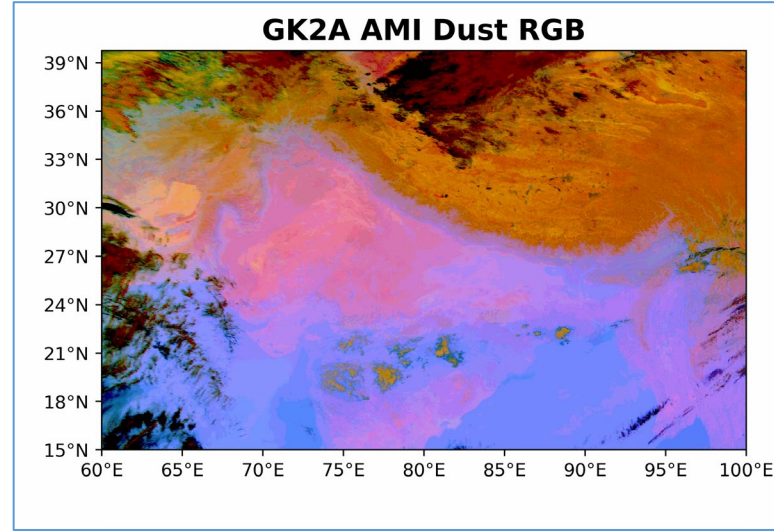
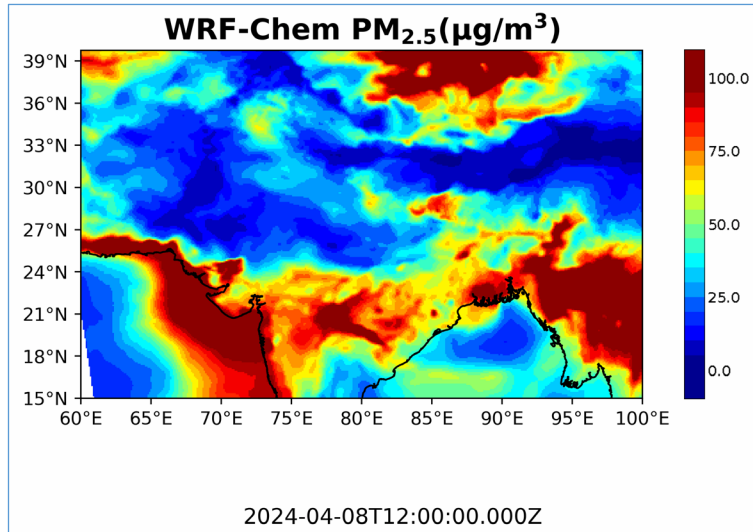
Regional Science-Policy Dialogue on Air Quality Management in the Indo-Gangetic Plain and Himalayan Foothills 14 – 15 December 2022, ICIMOD Headquarters, Nepal

- *Sharing experience on AQM*
- *Meeting regularly*
- *Enabling harmonization of practices*
- *Development of a regional framework*

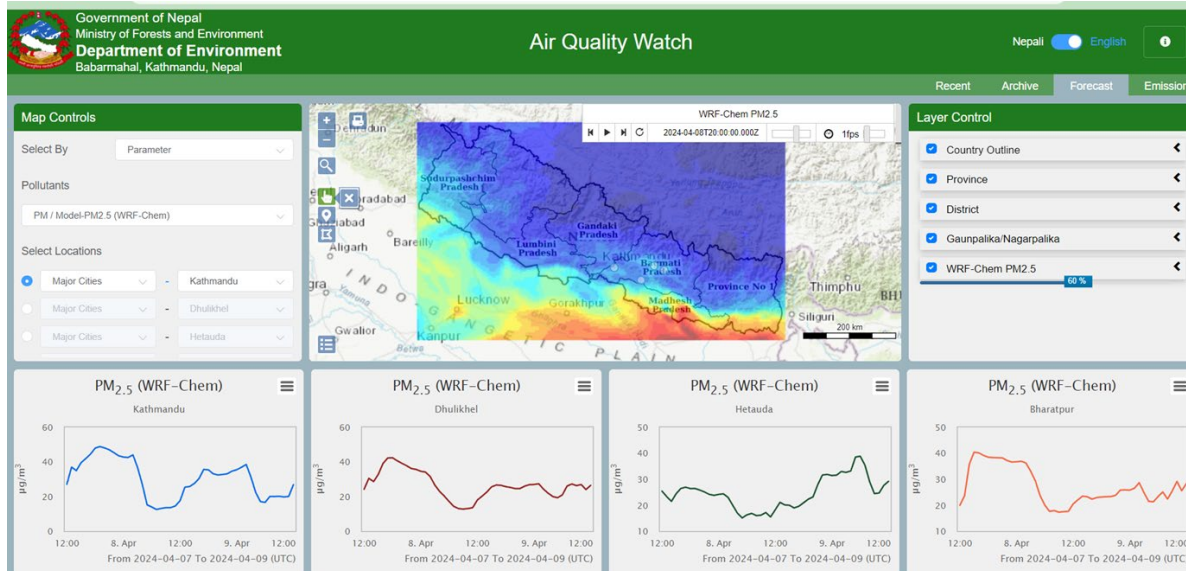


Air pollution monitoring & prediction

Air Quality Data Products



Nepal AQ Dashboard



Future plan 2024:

Enhancing Air Quality Applications in the Hindu-Kush Himalaya Region using Synergistic Remote Sensing, Modeling, and Machine Learning Techniques will support by Applied Sciences Team projects (AST-4).

<http://smog.icimod.org/apps/airquality/>

<http://smog.spatialapps.net/apps/airqualitynp/recent/?lang=en>



Ongoing Activities Under MTAP-V

Air Quality Monitoring Stations

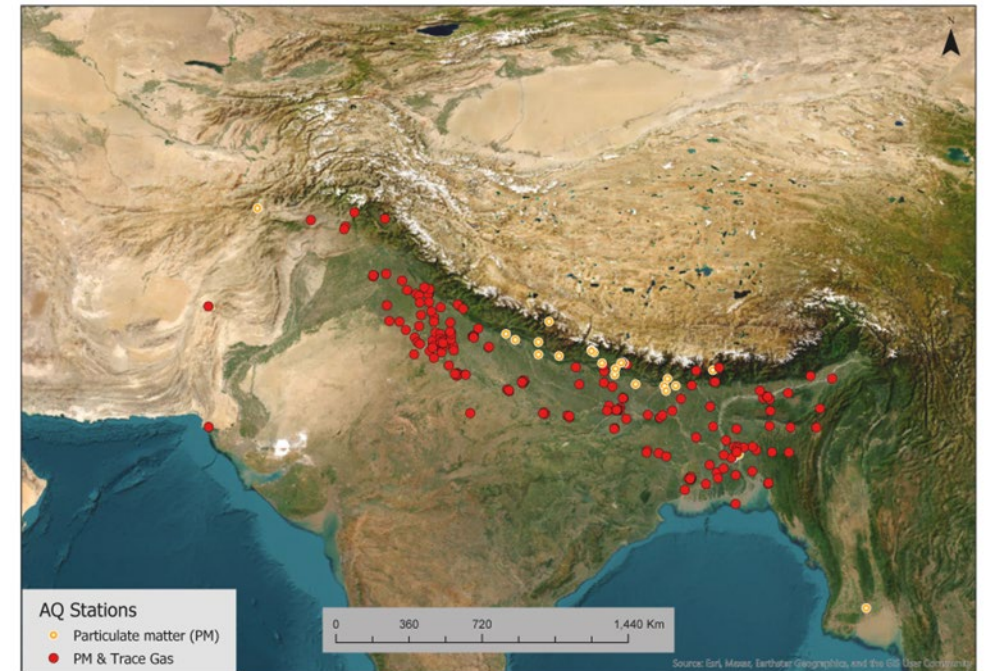
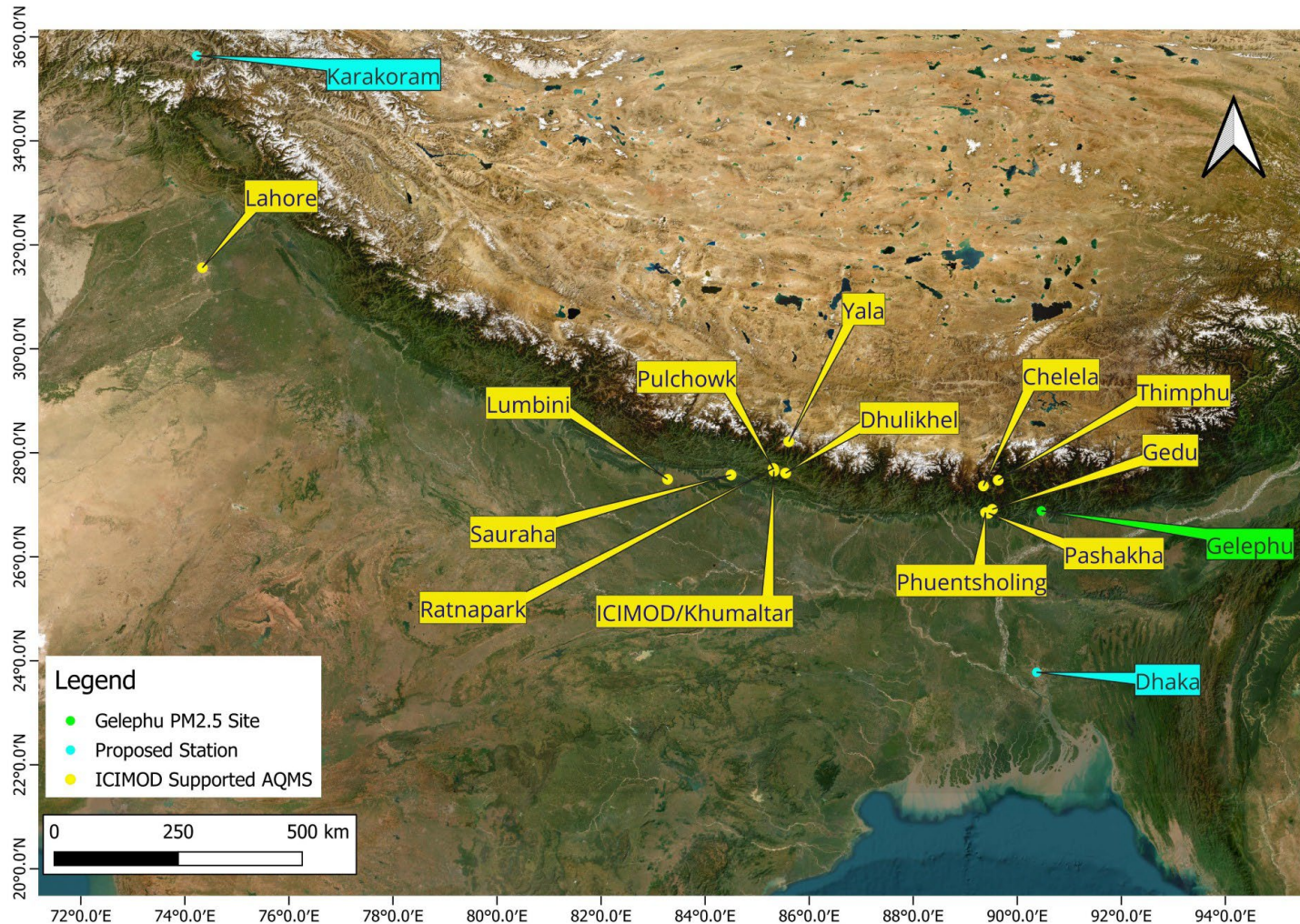


Capacity Building Activities

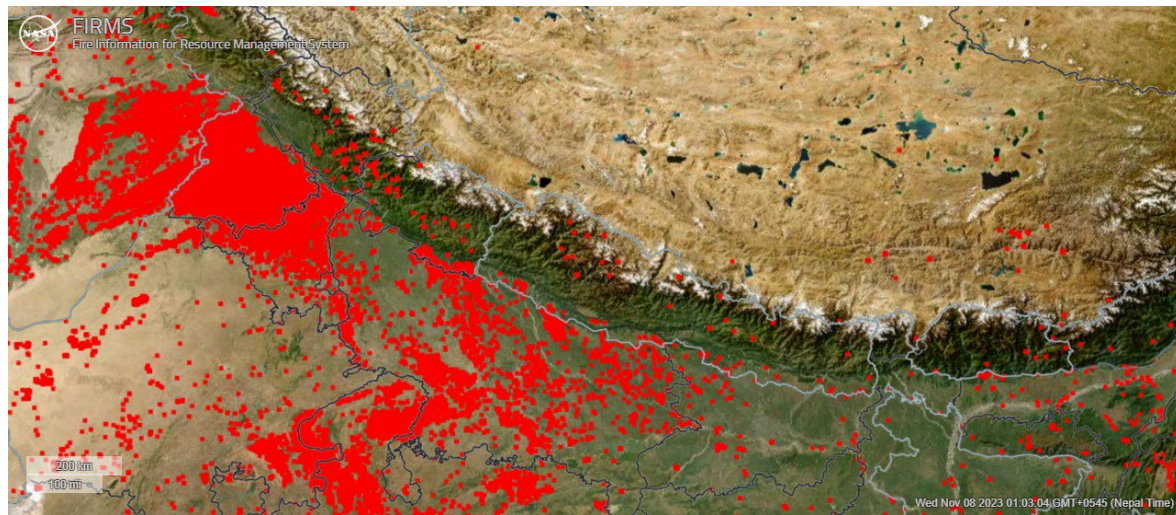


Ongoing Activities Under MTAP-V

➤ Monitoring stations over HKH



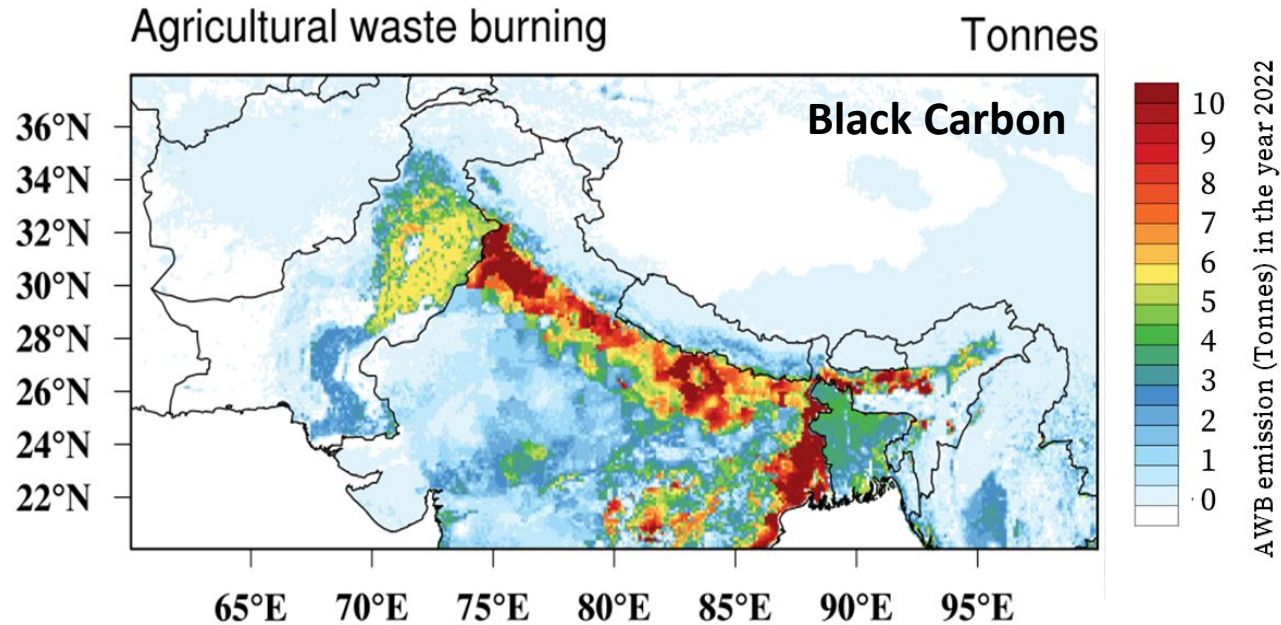
Reducing Air Pollution by Creative Use of Pelletization



1. Develop a Regionally Fit Framework for the use of pelletization of crop residue
2. Enabling policy and fostering practice environment.
3. Outreach and knowledge dissemination

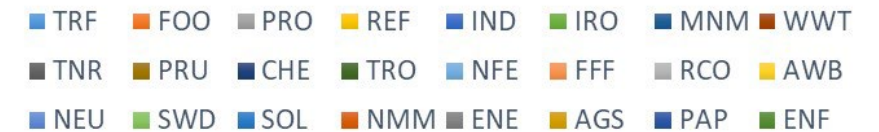
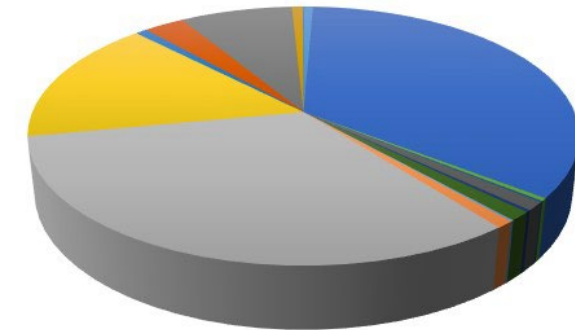


Agricultural Waste Burning in HKH



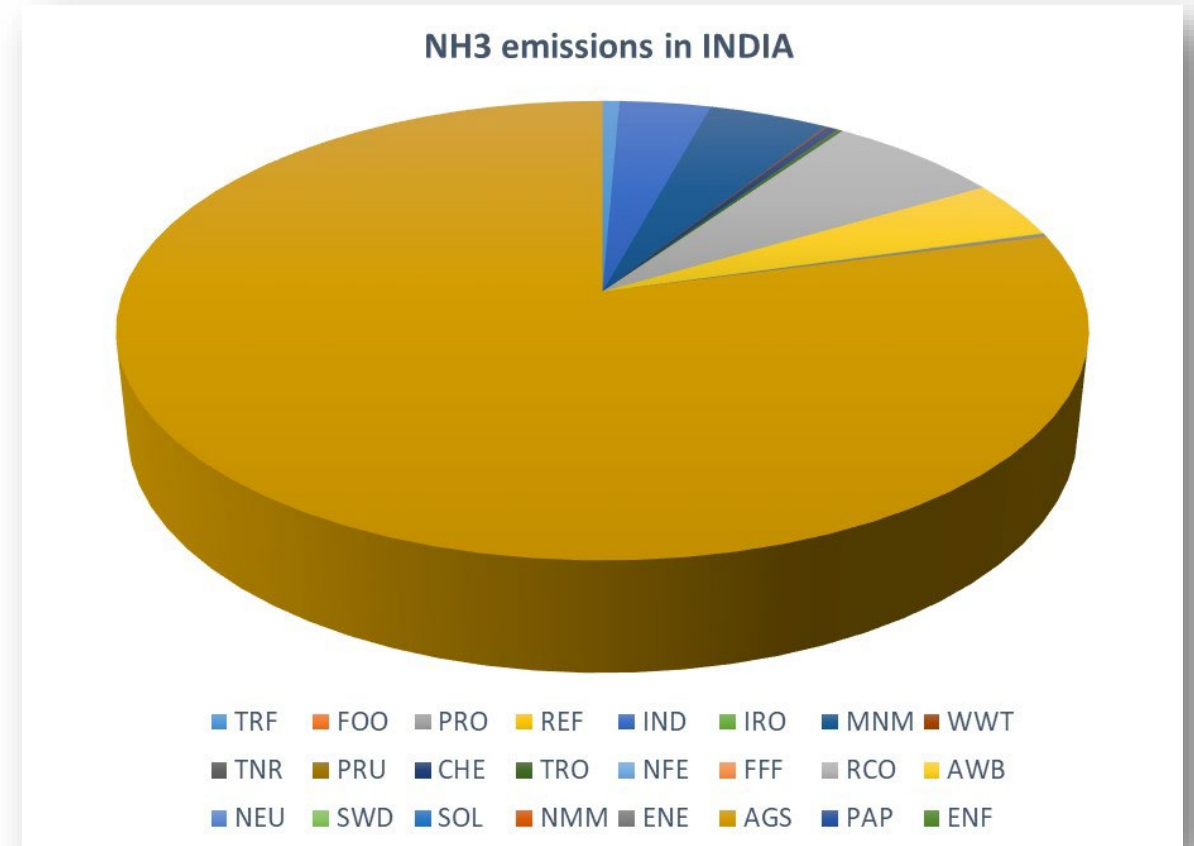
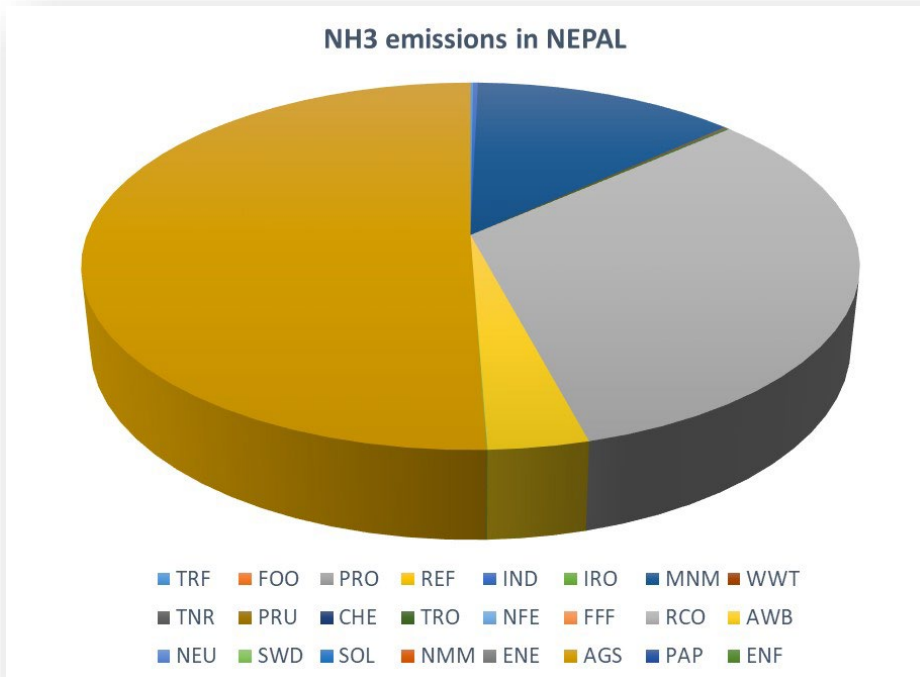
1. Residential emissions
2. Industry
3. Agricultural Waste Burning

PM2.5 emissions in INDIA



Ammonia emissions

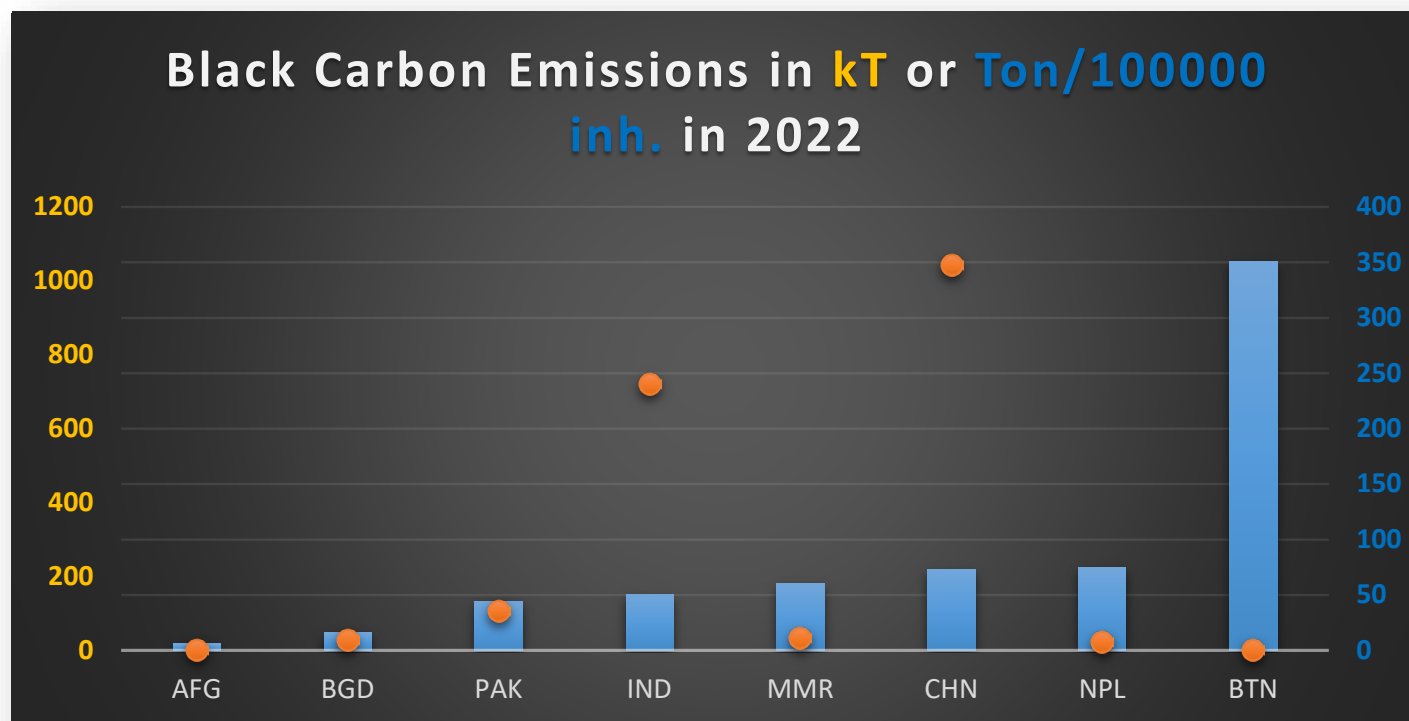
NH3 is responsible for the formation of PM2.5
Agricultural soils is the main emitter



High resolution emissions: To be developed...

- Next global **harmonized** version of EDGAR at 0.1° resolution in Q2 2024
- ICIMOD will develop a 1km emission inventory over HKH
- Objectives:
 - Higher resolution simulations and **forecast**
 - Develop a basis to foster **regional** discussions and global initiatives like EDGAR and HTAP to **harmonize** practices on emissions
 - Provide accurate sub-national estimates
 - Use for assessment of **mitigation strategies and support for AQ plans**

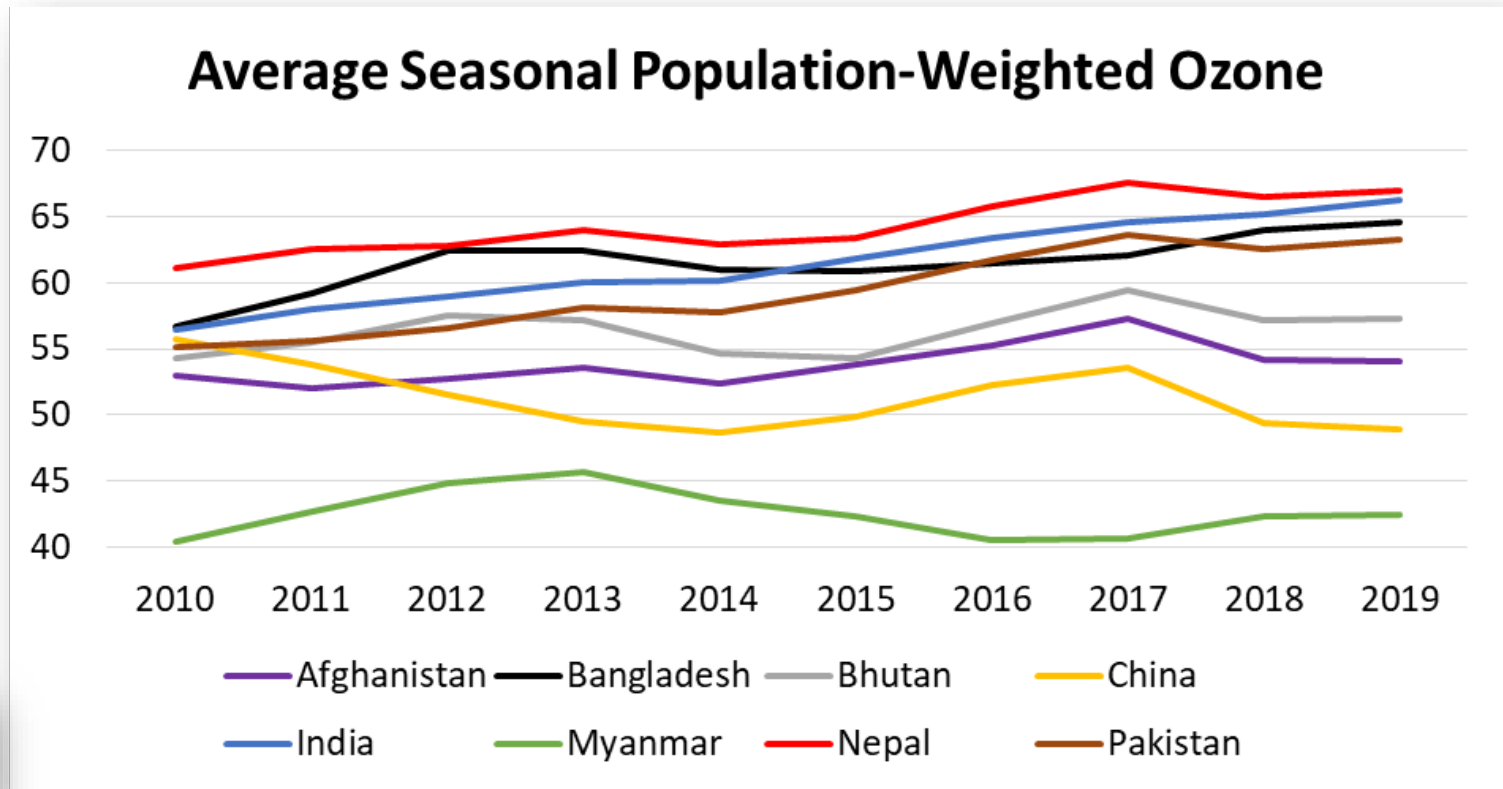
Current spatial resolution: 10km



Courtesy Monica Crippa (JRC) – EDGAR V8

Ozone : what's happening?

- Ozone is **rising** everywhere worldwide and particularly in HKH
- Ozone impacts **crop** yields and **Health**
- Ozone concentrations are usually higher in altitude site
- Reflection to better monitor Ozone



Source: <https://www.stateofglobalair.org>

- Methane emissions: Agriculture, Energy and Waste management


European Commission

CH₄ trends and interactions with O₃ at the European and global levels
TFIAM53 - Paris 15 -17 April 2024

Bertrand Bessagnet, [Claudio A. Belis](#), Monica Crippa, Frank Dentener, Rita Van Dingenen, Philippe Thunis

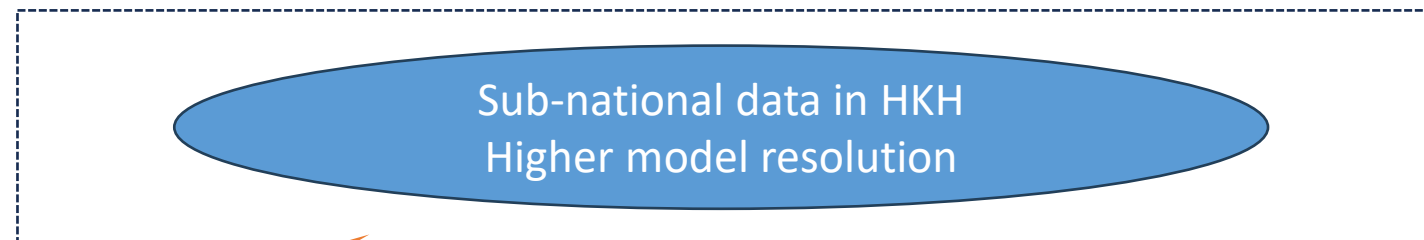
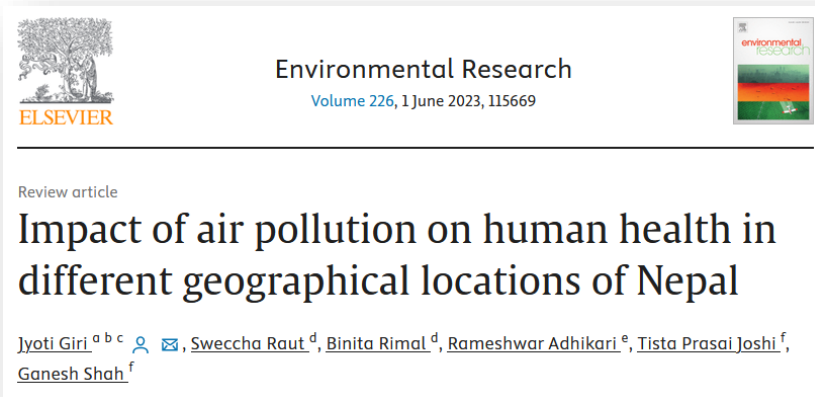
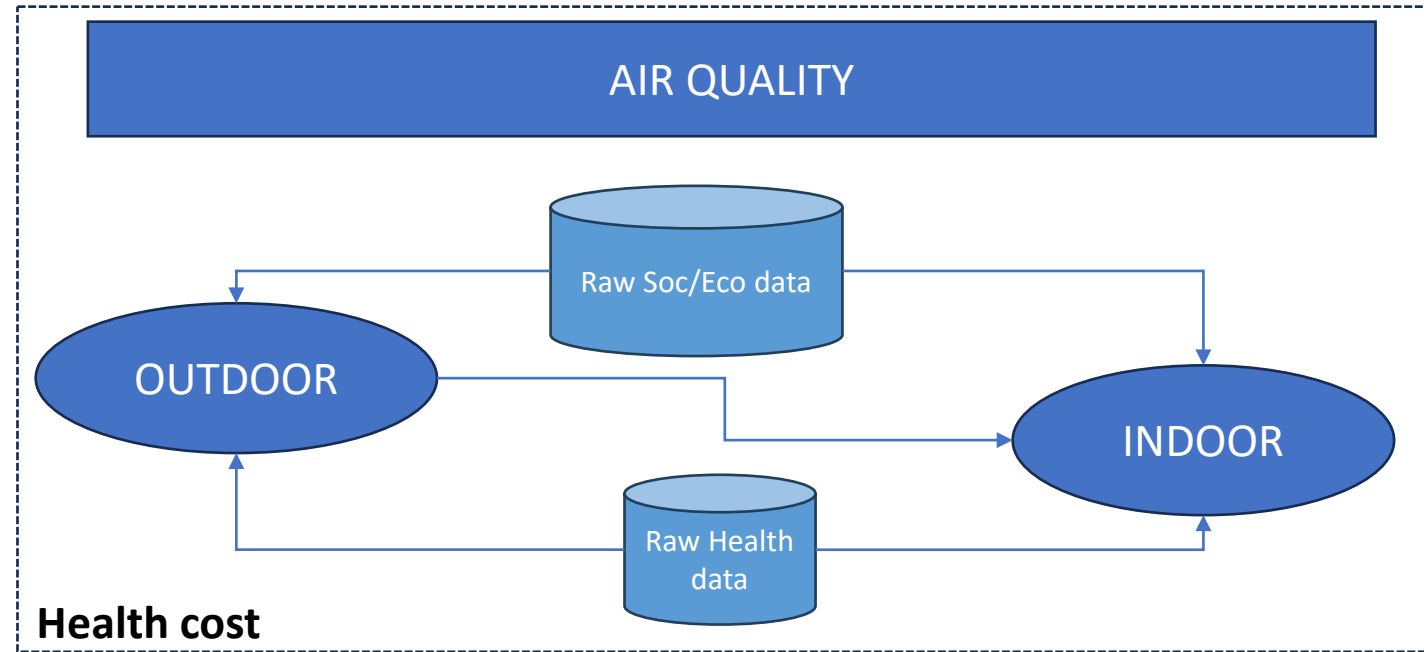
European Commission (EC), Joint Research Centre (JRC)
Dir. C, Clean Air and Climate Unit


Joint Research Centre



Health as a key to calculate cost and address Gender Equality and Social Inclusion issues

- Methodologies exist at **National scale**
- We can provide new data at subnational scale to support decision making
- Needs of **subnational** data (Health, socio-eco)
- Include **Indoor Air Quality**
- Workshop planned Q3 2024

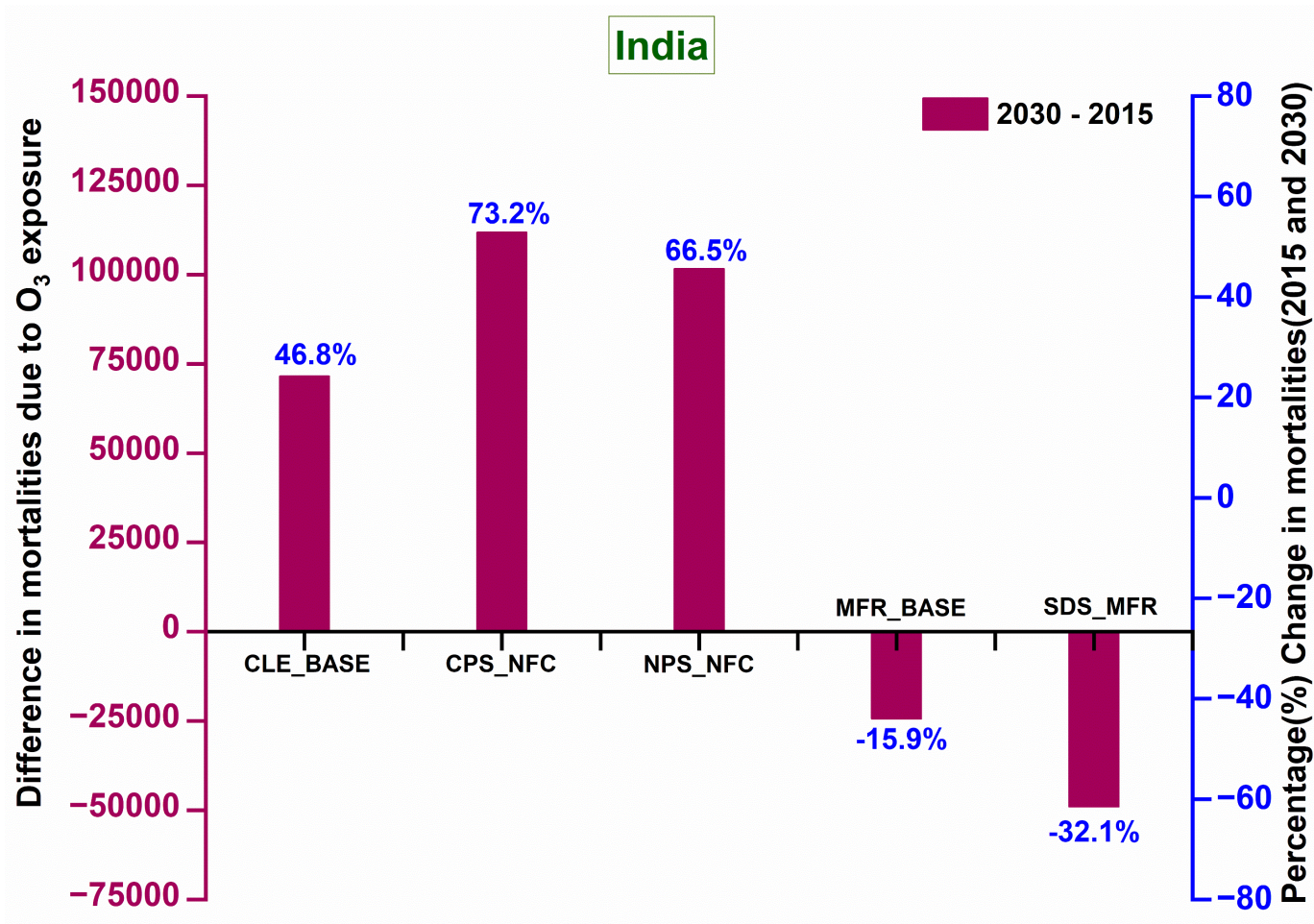


Our added value

GESI



Methane-related Ozone



Scenario analysis

Changes in mortalities due to O₃ exposure in 2030, relative to exposure of the year 2015 O₃ level and their percentage difference.

Source JRC (Claudio Belis) from FASST-TM5 model

Processed by ICIMOD: Arshini Saikia

Possible works with ADB

- **Development of high resolution emissions in HKH extended to South-East Asia**
- **Analysis of the impact of the Agricultural sector on Air Pollution with models**
- **Impact of methane-related O₃ on crop yields and mortalities**

MEET THE TEAM



Arun Bhakta Shrestha
Strategic Group Lead



Aneel Piryani
Programme Officer



Debabrat Sukla
Senior Communications Officer



Chimi Seldon
Communications Officer



Ashmita Shakya
Programme Officer

Action for clean air (SG1-AAB)



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Govinda Shrestha
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Deanna Sherpa
Programme Associate



Ravi Sahu
Air Quality Specialist



Dikra Prasad Bajgai
Air Pollution Measurement Associate (Instrument Associate)



Kamala Gurung
Gender and Natural Resource Management Specialist



Khushboo Sharma
Air Pollution Analyst - Observation



Sagar Adhikari
Air Pollution Analyst - Mitigation



Suman Sanjel
Air Quality Application Development Associate



Suresh Pokhrel
Aerosol Measurement Research Associate



Abu Selim
Young ICIMOD Professional-Bangladesh (Air)



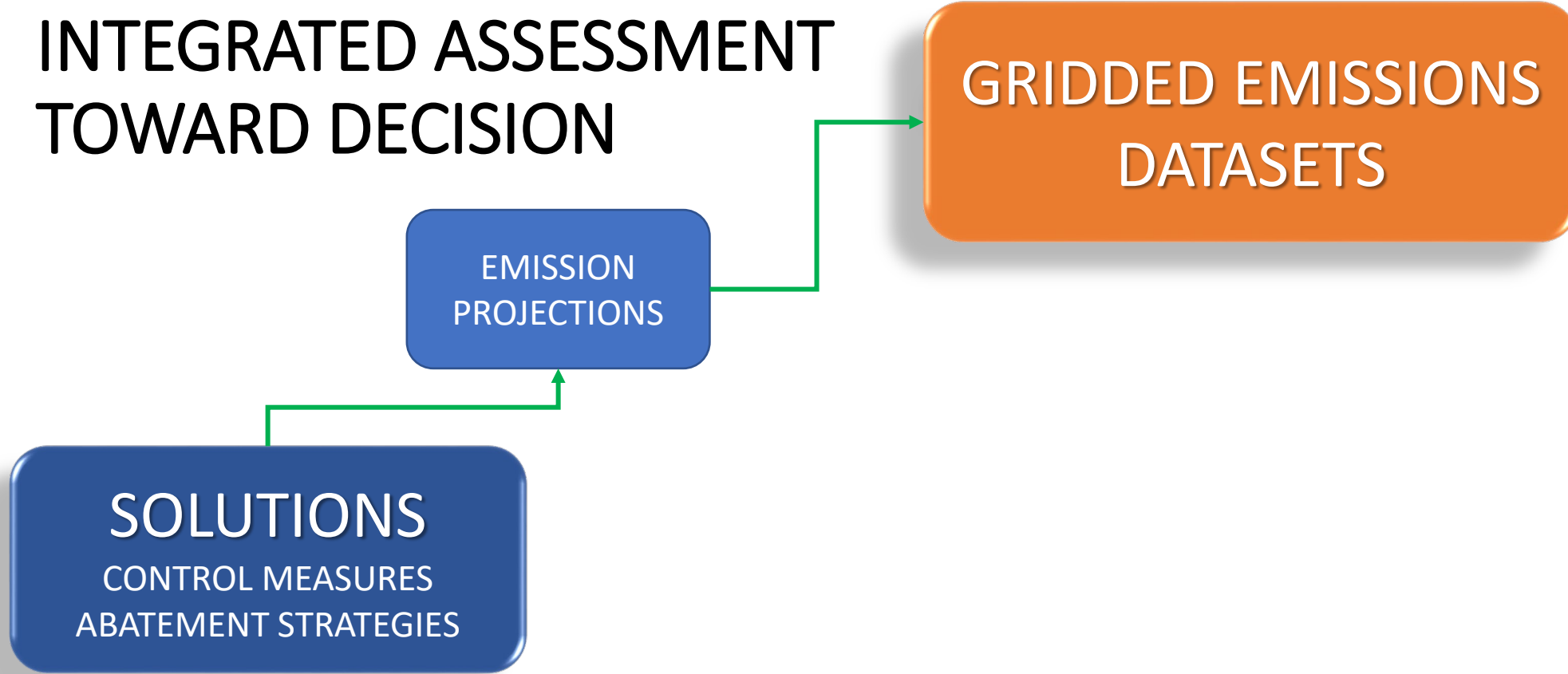


INTEGRATED ASSESSMENT TOWARD DECISION

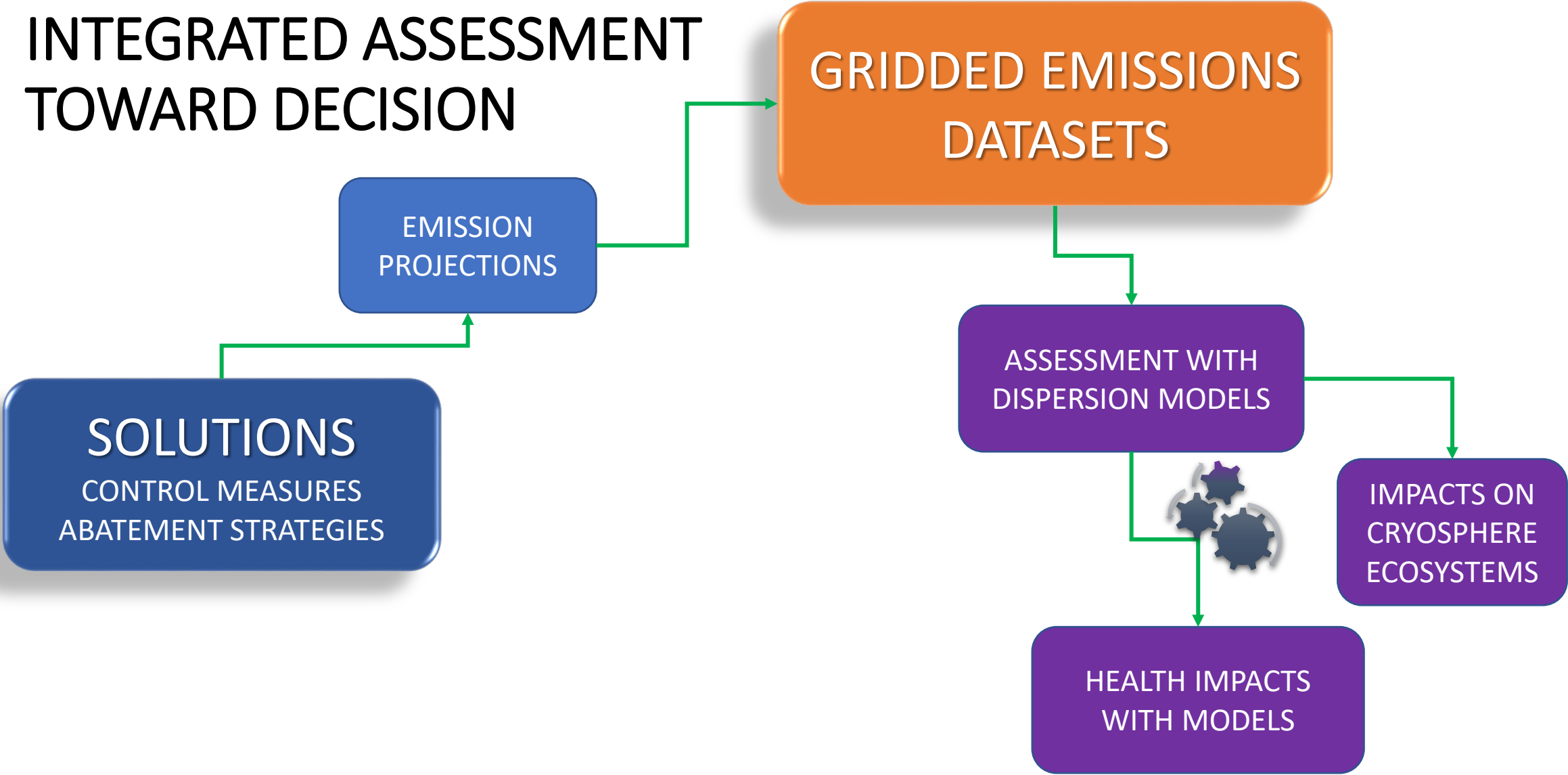
SOLUTIONS

CONTROL MEASURES
ABATEMENT STRATEGIES

INTEGRATED ASSESSMENT TOWARD DECISION



INTEGRATED ASSESSMENT TOWARD DECISION



INTEGRATED ASSESSMENT TOWARD DECISION

GRIDDED EMISSIONS
DATASETS

EMISSION
PROJECTIONS

ASSESSMENT WITH
DISPERSION MODELS

SOLUTIONS
CONTROL MEASURES
ABATEMENT STRATEGIES

IMPACTS ON
CRYOSPHERE
ECOSYSTEMS

Socio-Eco
analysis

HEALTH IMPACTS
WITH MODELS

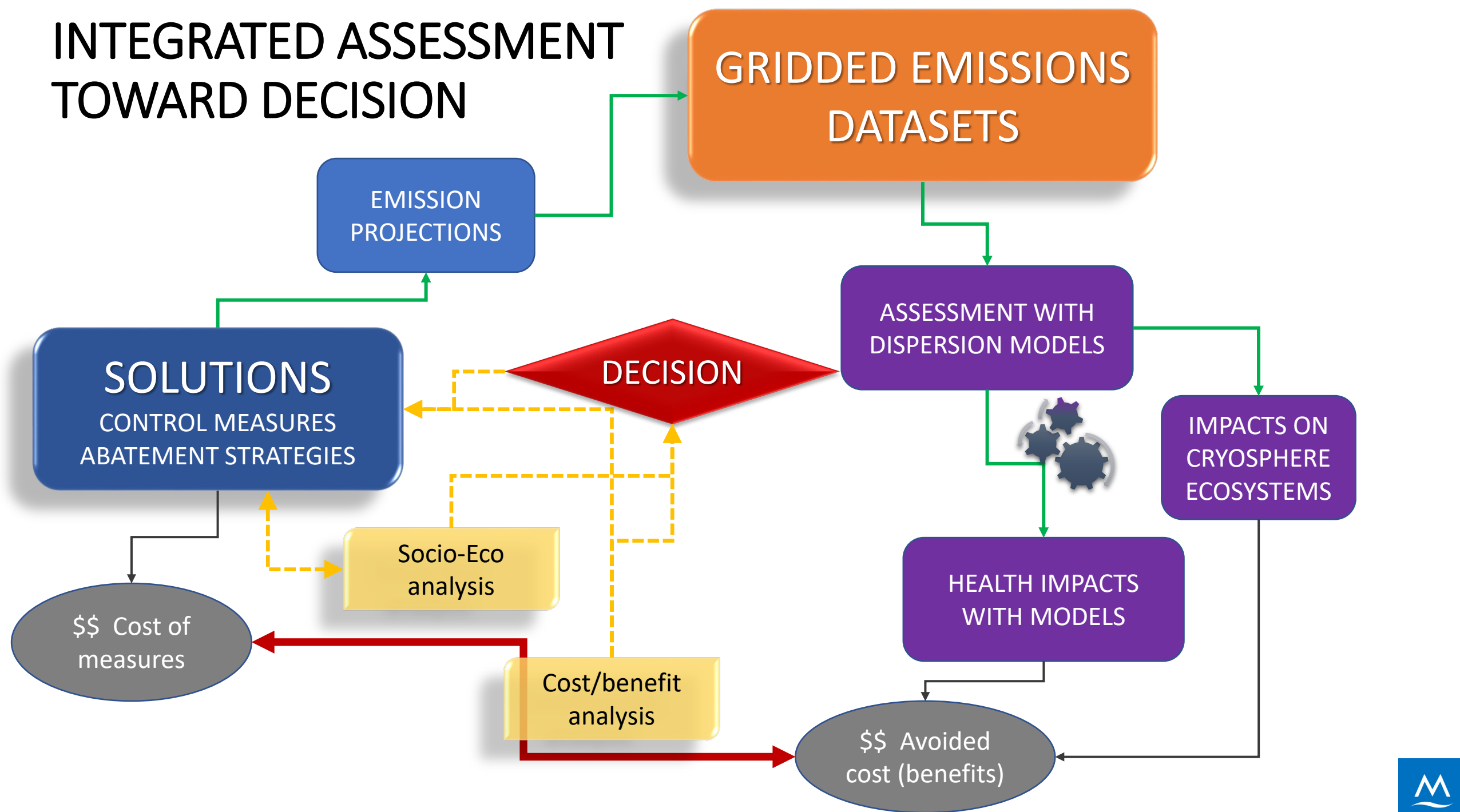
\$\$ Cost of
measures

Cost/benefit
analysis

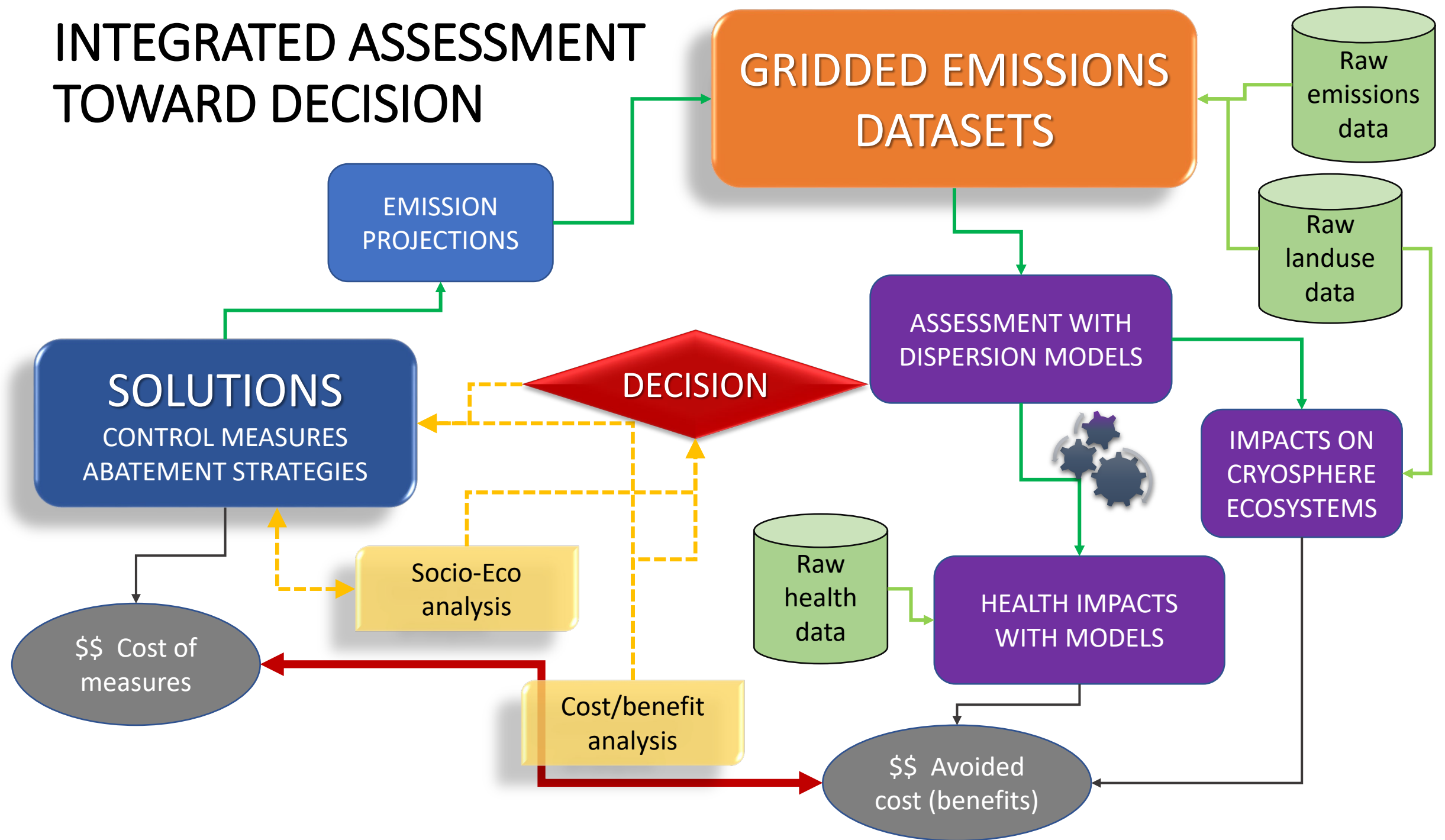
\$\$ Avoided
cost (benefits)



INTEGRATED ASSESSMENT TOWARD DECISION



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